

# WARCO-CHEMAG™ SERIES GF FILTER

## UNIVERSAL TYPE FILTRATION SYSTEMS CARTRIDGE – DISC – GRANULAR CARBON CANISTER

### INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS

Thank you for your purchase of a WARCO-CHEMAG™ filtration system. With proper installation and maintenance you can expect many years of trouble free operations. Failure to follow the recommended procedures may result in early and severe damage to your WARCO-CHEMAG™ filter system, and may also invalidate the warranty.

**SAFETY NOTE:** Plant operations and maintenance personnel should follow proper safety guidelines (e.g. OSHA) when servicing this equipment. Safety glasses and hand protection should be the minimum safety protection. Safety goggles are recommended during filter change-out of elements or media due to overhead suspension and risk of chemical spray or splash.

#### **1) SYSTEM MONITORING**

The WARCO-CHEMAG™ universal filtration systems are sold with and without centrifugal magnetic drive or mechanical seal type pumps. Special attention should be given to the recommended operating pressures for these pumps to prevent pump damage resulting from dead-heading, dry-running or cavitation. Constant monitoring with flow meters or a power monitor will indicate a critical minimum flow setting (i.e., bath turnover rate) for filter change-outs. Air leaks in the suction line will lead to pump cavitation, which is normally indicated by erratic pressure readings on the filter gauge (s). Please refer to pump's operation and service guide for complete pump installation, start-up and maintenance.

**Pump Protection:** If using a centrifugal pump that is not a self-priming design, a flooded suction will be required to maintain proper prime for the system to function normally.

#### **2) INSTALLATION**

WARCO-CHEMAG™ filtration systems are shipped completely assembled and ready for installation. Please note filter media is sold separately. It is recommended that the system be located as close as possible to the process tank. Also, the nominal pipe or hose diameter of the pump suction port must be adhered to when sizing the suction and discharge line to ensure proper flow velocities. **Do not decrease the pipe size or hose size on the suction or the discharge pump connections.** It is recommended to use solid piping or hoses for plumbing the unit (s) to and from the process tank. Sharp 90° degree fittings (elbows or tees) should be mounted a minimum of 10 pipe diameters from the pump inlet to prevent turbulence and excessive wear of the pump components.

WARCO-CHEMAG™ filter systems are free standing and stable when placed on flat level surface. We strongly suggest installing valves in front and after the filtration system. By closing off inlet and outlet valves when system is shut down, this will prevent back siphoning and flooding. A drain line should be installed. The filtration system is equipped with a manual drain valve, located underneath chamber bottom support base. This drain valve can be used to drain down the solution inside the chamber, when replacing filter media. Also a clear hose should be installed from the manual air bleed valve.

The bleed vent valve located on top of chamber's lid assembly should run back to the process tank or nearby drain. This vent hose will prevent solution from spraying when venting air from chamber. The use of suction strainer is recommended when large solid particulate matter is present and could enter the pump. Oversized strainers are recommended to prevent an excessive flow restriction. The strainer should be mounted a minimum of 10 -20 pipe diameters from the pump inlet. The screen size should be 20-50 mesh. A regular maintenance schedule should be implemented to prevent flow restriction of the pump. Installing additional pressure gauges on the inlet and discharge side of the strainer (s) this will allow for monitoring a pressure drop for proper maintenance.

### **3) ELECTRICAL**

All single-phase units are factory wired for 120-volt operation. For three-phase operation, the installation of external fused disconnect switch (supplied by others) should be installed near each unit. Rotation for the system's pump motor must be correct. Refer to pump's manual for details. View the motor from the fan end, and bump start the pump motor to verify correct rotation. The motor fan blades should rotate counter-clockwise. A qualified licensed electrician should do all wiring and connections.

***For added pump and media protection consider LINEMAN™ pump power monitors that can be programmed for safe minimum and maximum operating conditions.***

### **4) PRELIMINARY OPERATION**

Please take a moment to record all the model, serial, and product code numbers. This information will come in handy for future references and filter media replacement. Care should also be taken to protect the pump components against unnecessary wear and physical abuse. Review parts list and maintain an emergency inventory of pump replacement items to assure that unit is returned to service with the least delay.

Prior to start up, open the chamber's top lid assembly by loosening each Tee handle hold down bolt assemblies. Lift lid cover straight up from the shell. Please note the chamber features a tilt lid design. This allows the lid to remain upright in place while you service the unit. Inspect the internals to see if the filter elements are correctly in place, and tighten down by an orange colored compression spring nut cap assembly.

To prevent dry-running of the pump on start-up, pour 1 or 2 gallons of solution inside the chamber to fill the pump casing. Close and tighten lid assembly by hand, no tools are required. Inspect all pipes, hose fittings and band clamps to ensure that they are secured, to prevent possible leaks. Throttling a discharge valve to the maximum recommended pump pressure can perform pressure testing the complete system, further inspection of all pipes, hoses, and fittings should then be made.

**Pump Protection:** Do not operate the pump in a closed discharge (dead-head) condition for extended time periods (< 1 minute).

Also a minimum recommended operating pressure is necessary to prevent pump operating at run out, which is subsequent pump damage due to cavitation. Inducing backpressure may be required on systems with low head pressure by throttling a discharge valve or a fixed orifice.

## **5) SYSTEM START-UP**

Open all inlet/outlet valves and energize the pump motor. Open the manual air relief vent valve located on chamber's lid assembly. Bleed off the entrapped air from chamber. Close valve when you see no more air bubbles present inside the clear vent hose that runs back to process tank or drain. As the filter chamber media removes contaminants from the process tank, the pressure drop across the unit will slowly rise. This can be observed by having a pressure gauge guard assembly installed on the chamber lid cover. In normal operation it is desirable to change the filter media typically when it reaches 7 PSI above the initial pressure, depending upon the element design. Do not exceed 10 PSIG differential pressure across filter media. A drop in flow will reflect rise in pressure if a centrifugal pump is being used. When the flow drops below an acceptable turnover rate, the filter media should be changed.

## **6) CARTRIDGE ASSEMBLY & OPERATION**

The filter chambers will either hold 10", 20", 30" or 40" long filter cartridges depending on the filter system model being used. The chambers are design to use standard D.O.E. (double open end) type filter cartridges. The flow path is from the pump inlet, up thru the bottom of chamber, across the filter media from outside to inside, then down thru the center of the filter media (core) and exits thru a port located on the side of chamber bottom base. The filter cartridges are supported inside the chamber by cross post guides, and secured down by an orange colored compression spring nut cap assemblies. Each nut cap assembly has a knife-edge on one side, which seals the filter media ends off. It is essential that the cap assembly is not damaged, and installed tightly to prevent incoming contaminated solution to bypass the filter media.

### **TO REPLACE FILTER ELEMENTS OR CARBON CARTRIDGES**

**SAFETY NOTE:** Do not attempt to open chamber top cover until pressure has been relieved through a vent or drain valve.

Shut down the pump. Close all inlet and outlet valves. Open drain valve and drain chamber. Loosen lid Tee handle cover hold down bolts. Lift lid cover straight up from the shell. Please note the chamber features a tilt lid design. This allows the lid to remain upright in place while you service he unit.

- 1.** Unscrew and remove by hand the orange colored compression spring nut cap assemblies.
- 2.** Lift straight up to remove the spent filter cartridges from chamber.
- 3.** Insert new filter cartridges, disc media or carbon, reinstall and tighten compression nut cap assemblies.
- 4.** Reinstall and tighten by hand chamber's lid hold down bolt assemblies no tools are necessary.
- 5.** Review system start-up (see section 4 & 5).
- 6.** WARCO offers an assortment of different types of CHEMTREX™ filter elements with various micron ratings from 0.5 to 100 micron absolute for fine-tuning your process requirements.

#### **Guideline for carbon cartridges:**

Activated carbon is an effective method of removing organic impurities from plating baths and other chemical solutions. Carbon elements require a low flow rate/contact time to properly activate with the process solution. The quality of solution purification is controllable by the contact time between the solution and the carbon. The flow through the carbon should be adjusted to 1 to 3

GPM flow rate for each pound of carbon that is being used. A pressure gauge installed on the carbon chamber inlet piping, will facilitate valve adjustment for establishing the desire flow rate thru the chamber.

## **7) DISC ASSEMBLY & OPERATION**

The Series GF disc assembly should be positioned and stacked in sequence as per the assembly diagram. The GF all polypropylene design is secured by the EPDM or Viton elastomeric compression gland. Depending upon the thickness of the filter media, it may be necessary to adjust the number of discs according to the gap between the top of the chamber and lid. This will ensure proper compression of the disc media. Gradual and uniform compression of the swing bolts using an opposing "star pattern" is recommended to avoid high stress points on the disc pack.

An overhead hoist will be required to remove and reposition the disc assembly due to the combined mass filter components and solids (e.g. carbon, D.E. & wetted contaminants). The lower support plate is equipped with an o-ring to ensure positive sealing without the risk of by-passing; be sure this o-ring is properly seated before reinstalled the disc pack.

## **TO REPLACE DISC MEDIA OR CARBON CANISTER**

**SAFETY NOTE:** Do not attempt to open chamber top cover until system pressure has been relieved through a vent or drain valve after shutting off the pump.

Shut down the pump. Close all inlet and outlet valves. Open drain valve and drain chamber. Loosen lid Tee handle cover hold down bolts. Lift lid cover straight up from the shell. Please note the chamber features a tilt lid design. This allows the lid to remain upright in place while you service he unit.

- 1.** Unscrew and remove by hand the orange colored compression spring nut cap assemblies.
- 2.** Lift disc assembly or carbon canister straight up from the chamber with an overhead hoist to remove the disc stack assembly or rechargeable carbon canister.
- 3.** Disassemble (according to the assembly drawing) remove spent media, wash down any residue
- 4.** Install fresh media (disc stack) or carbon (carbon canister)
- 5.** Reassemble and install (according to the attached assembly drawing) and uniformly tighten by hand the chamber lid swing bolts using an opposing "star pattern".
- 6.** As an alternative to servicing only one disc stack or carbon canister, the entire assembly can be removed from the filter chamber and set aside for servicing. A complete spare assembly can be pre-charged with fresh discs or carbon (for carbon canisters) for a rapid change-out. This will minimize downtime. The assemblies should be wrapped in plastic to protect from dust and debris.
- 7.** Review system start-up (see section 4 & 5).
- 8.** WARCO offers an assortment of different types of CHEMTREX™ filter media, with various micron ratings from 0.5 to 100 micron absolute for fine-tuning your process requirements.

## **8) CARBON CANISTER ASSEMBLY & OPERATION**

The internal rechargeable carbon canister assembly has been designed for quick reloading of granular carbon. Two basic configurations are available; with an integral absolute rated high capacity filter element and in a simplified design without an internal element other than mesh screening media.

An overhead hoist will be required to remove and reposition a charged canister due to the mass of granular carbon. The spigot male mounting fixture is equipped with O-rings to ensure positive sealing without the risk of by-passing. Wetting dry O-rings with water or solution will allow for easier seating without stressing or potentially rolling an O-ring.

For systems with the integral pleated element, replacement is typically recommended after several uses depending upon the visual condition and solids build-up.

## **9) GASKET INSPECTION**

Depending upon the operating conditions (e.g. temperature, pressure, chemistry, etc.) and frequency of filter element change-outs, the square chamber lid gasket should be inspected and changed on an annual basis to avoid costly leakage or spills. Special care should be taken to thoroughly clean and rinse the gasket seat before installation to avoid potential leak pathways from the bridging effect of solid particle.

## **10) PUMP**

Refer to the pump and motor IOM (Installation, Operation & Maintenance) manual for pump guidelines.

## **11) MOTOR**

Refer to the motor IOM (Installation, Operation & Maintenance) manual for motor guidelines.



## ***Warco, Inc***

821 Sivert Drive  
Wood Dale, IL 60191  
Tel. (847) 549-8695 – Fax. (847) 549-8696  
E-mail: [sales@warcoinc.net](mailto:sales@warcoinc.net) - Web-site: [www.warcoinc.net](http://www.warcoinc.net)